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INSTRUCTOR PILOT'S ROLE IN SIMULATOR TRAINING. PHASE III.(U)

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Technical Report NAVTRAEQUIPCEN 76-C-0034-2

INSTRUCTOR PILOT'S ROLE IN SIMULATOR TRAINING (Phase III)

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This third phase of the study of the Instructor Pilot's Role in Simulator Training was concerned with the translation of the IP functions into specification format. The problem addressed was the development of a conceptual subsystem which could be utilized for the demonstration of the defined IP console. The primary result of this study indicates that a console on flight IP skills and capabilities is feasible.

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SUMMARY

The first phase of the study of the Navy Instructor Pilot's role in the use of flight simulators in fleet pilot training was concerned primarily with reviewing current training operations and training simulators. The report revealed that significant changes have occurred in recent years in terms of instructor personnel and equipment. Most important was the conclusion that simulator instructor consoles are not designed for training implementation and that the IP is trained neither in simulator utilization nor in "how to instruct." The problems were further compounded by the lack of well-defined simulator training syllabi and supporting documentation.

The second phase of the study involved the development and detailed analysis of the IP functions in simulator pilot training. In addition, the interaction of the Navy Flight Officer Instructor was analyzed. A total of ten functions involving thirty-five subfunctions was structured. A conceptual console of nine modules which could support these functions was outlined. The interaction and relationship of the Navy Flight Officer Instructor and the IP were explored for those weapon systems in which an NFO is part of the aircrew.

The third phase of the study and subject of this report was concerned with the translation of the IP functions into specification format. The problem addressed was the development of a conceptual subsystem which could be utilized for the demonstration of the defined IP console. The primary result of this study indicates that a console on flight IP skills and capabilities is feasible.

The three phases of the study of the Instructor Pilot's Role in Simulator Training have led to a conceptual system which optimizes the utilization of the IP in the simulation training program. The conceptual system attempts to both exploit the skills developed for flight training as well as prevent any negative transfer between the two instructor situations, i.e., flight and simulator.

PREFACE

The value of the results of any analysis is contingent upon the quality of the data which are input. This is particularly true when dealing with operational data. Therefore, whatever success has been achieved must be credited to the many officers and men in the training squadrons and staff who devoted time and effort to provide the data utilized in the study. In particular, the efforts of the following personnel should be recognized.

Mr. James Bolwerk - Commander, Naval Air Force United States Pacific Fleet Staff, who arranged and coordinated the West Coast visits and who provided insight into many problem areas.

Mr. R. Goodwin - Commander, Naval Air Force United States Atlantic Fleet, who coordinated the East Coast visits.

The Officers-in-Charge of the Fleet Aviation Specialized Operation Training Group Detachments and their staffs, who provided the data on simulation operations, answered questions, and assisted in our observation of on-going training.

The operation and training staffs of the Readiness Training Squadrons, who helped isolate the data required, completed questionnaires, and described training evolutions and problems.

Finally, special appreciation is expressed to Mr. Vincent J. Sharkey, project Technical Representative, who provided insight into problem areas and arranged the contacts with fleet personnel.

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SECTION I
INTRODUCTION

BACKGROUND

Effective utilization of simulators in the pilot training program has been a continuing concern of the operational training community. A major problem area has involved the Instructor Pilot (IP) and his role in the use of simulators. Although it was recognized that his expertise should be exploited in this area, questionable success has been achieved in interfacing the operations and flight-oriented characteristics of the IP with the synthetic and ground-oriented characteristics of the simulator. Much of the problem has stemmed from hardware (and software) limitations inherent in early pilot training simulators, especially of the analog type. However, modern solid state technology, especially in the digital computer area, has or appears to have removed these constraints. In addition, advances in training methodology appeared to provide the means to achieve the required integration of the instructor into an effective synthetic training system.

To verify that the IP could be more effectively utilized in simulation training, the Human Factors Laboratory of the Naval Training Equipment Center (NAVTRAEQUIPCEN) undertook a three-phase R&D program in 1974. Phase I was directed toward identifying the existing and projected role of the IP in simulator training, as well as the characteristics of the IP's operating console in existing and future trainers. Phase II was directed toward the analysis and structuring of IP instruction functions in simulation training. Phase III, the results of which are the subject of this report, was concerned with the translation of the IP functions into specification format.

PHASE I RESULTS

Data on IP operations were collected from the major Readiness Training Squadrons in the U.S. Navy. The results, in general, revealed that:

- The IP has clearly assumed the role of simulator flight instructor.

- The specific role of the IP and the Simulator Operator (SO) varies with the type of simulator, weapon system, and level of training involved.

- The IP and SO are not trained to instruct on simulators, either in simulator operation or methods of instruction.

- Simulator syllabi are not designed to simulator training requirements.

- Instructor consoles are not designed for IP use.

- The Navy Flight Officer's (NFO) role in simulator instruction interacts with the IP's role and must be considered in console design.

In short, the simulator instructor for pilot training is typically untrained for that job, is not provided essential information for the task (e.g., syllabi, scripts, and scenarios), and is expected to perform at a console not designed for the job.

PHASE II RESULTS

Phase II was directed toward translation and analysis of the generic role of the IP identified in Phase I into specific detailed functions. These results could then be utilized for the development of a specification for the IP interface to achieve effective integration of the IP into the overall pilot training simulation system. The Phase II effort concluded that:

● The functions of the IP in simulation pilot training can be logically structured and allocated to manual and machine-supported functions within the constraints imposed by existing simulator design philosophy. Implementation of the functions requires the use of interactive terminals operating in the background mode of the simulation software or operating as an independent system which "talks" to the simulator in terms of data exchange and control functions. The details of the implementation require weapon system data, at least as to the type of system involved, i.e., single-place attack or multi-place anti-submarine warfare (ASW).

● The implementation of the functions outlined requires the development of supporting data. These include:

(1) Detailed syllabi designed to simulator training requirements

(2) Detailed scenarios and scripts, including controller messages and contingency options

(3) Learning objectives and performance criteria

(4) Checklists for configuration control and management

- Functionally standardized modules can be developed within the state-of-the-art to implement the functions of the IP. These modules can support IP training as well as "self/peer" training and related simulator training resources management data. The interface with other training data systems should be explored.

- The relation of simulation training to other training media in implementing training objectives needs to be explored. Efficient and effective use of simulation requires the support of other training media.

- Instructor console design should be function-oriented, i.e., training-oriented as opposed to simulation control-oriented. Achieving this type of interface between the IP and the simulation system is within the state-of-the-art; providing requirements are well-defined.

A total of ten functions involving thirty-five sub-functions was structured. A conceptual console of nine modules which could support these functions was outlined. The interaction and relationship of the Navy Flight Officer Instructor and the IP were explored for those weapon systems in which an NFO is part of the aircrew.

SECTION II

PROBLEM

The overall project was directed toward developing information to make decisions in four areas:

(1) The role of the IP and SO in the use of flight simulators as an integral part of the system for training pilots

(2) The design of the IP/SO consoles

(3) The degree to which at least hardware components might be standardized

(4) The possibility of using the instructor console for training the IPs

With the role and requirements having been defined in the Phase I study, and the functions analyzed and defined in the Phase II study, the remaining tasks to achieve a usable design product involved the last three objectives. Therefore, the problem addressed in this study was the development of a conceptual subsystem which could be utilized for the demonstration of the console defined.

SECTION III

APPROACH

GENERAL

The translation of requirements into design terms is, in large, the analysis phase of the overall systems engineering approach, i.e., Define›Analyze›Design›Evaluate›Develop›Test. However, the basic steps of define, analyze, design and evaluate are iterative at each phase and represent a rational approach to each task even though some steps may be trivial at certain phases. For example, design is a minor step in analysis if proven analytical methods can be utilzed. Therefore three tasks were structured to complete the Phase III study. They are reviewed in the following paragraphs, along with related subtasks.

TASK A - FUNCTION ANALYSIS

The first technical task involved the detailed analysis of the functional requirements from the Phase II effort. The analysis had a two-fold purpose. The first objective was to identify design requirements and the second was to expose any functions which presented a development risk and required technology evaluation.

Seven basic instruction functions were developed in the Phase I and Phase II studies and formed the basis for this analysis. These functions were:

- Prepare - get data on student, syllabus, scenario, guides, status of simulator, etc.

- Brief - brief student (and support staff) on evaluation, requirements, approach, etc.

- Initialize - enter initial conditions, mission data, etc., into the simulator

- Train - conduct simulator training mission

- Evaluate - assess student performance

- Debrief - debrief student (and support staff) on the mission

- Data Management - update student and simulator records

An additional three functions related to the IP activities were also identified:

(1) Develop syllabus

(2) Train IPs

(3) Self/Peer training

The information requirements and tasks involved in the ten functions were also developed. Appendix A contains the detailed list of these requirements.

These functions and the training applications developed in Phase II, i.e., by type of weapon system, were analyzed in terms of modular concepts and design requirements.

The output of this task formed the basis for the conceptual subsystem design.

TASK B - CONCEPT DEVELOPMENT

The main objective of the study was to develop a functional type of description which could be applied in a demonstration and a test. The task therefore involved identifying and structuring the conceptual design in sufficient detail to permit a test application.

TASK C - DOCUMENTATION

The last task involved the preparation of the final report which discussed the effort conducted.

SECTION IV
RESULTS

The Phase II program had developed a conceptual allocation of functions to the IP and to system hardware. In addition, a preliminary modular concept was developed. One of the features explored was the use of "remote" terminals to support some of the functions. Several very attractive benefits appeared possible. First, increased utilization of the simulator could be achieved by dedicating it to the actual training function. The remote or supporting terminals could be used to conduct all other functions. The function allocation which results is as follows:

Simulator	Remote Terminal
Initialize	Prepare
Train	Brief
Evaluate	Debrief
IP Train*	Develop Syllabus
Self/Peer Train	Train IP

*Only IP training requiring simulator use

A generic time line analysis of this allocation assuming a typical one-hour training session illustrated the potential benefit. It is reproduced as Figure 1. Since a single IP normally performs all of the instructing functions for a given student, the concept is operationally feasible, i.e., the IP-student "pair" can flow through the remote terminal/simulator type of system.

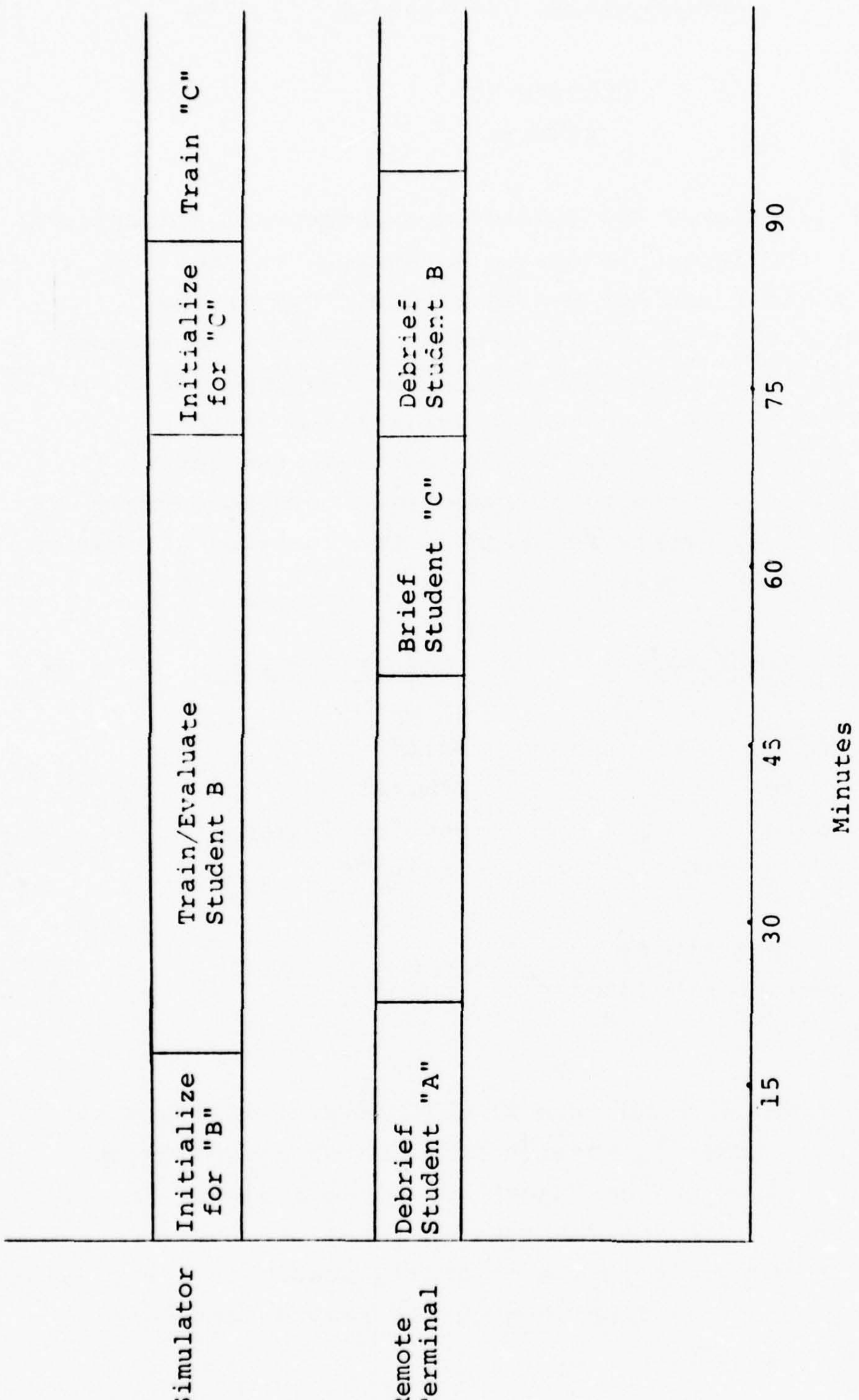


Figure 1. Time Line Analysis of Use of Remote Terminal and Simulator

Software considerations had also been explored in Phase II and illustrated that conventional software architecture could support the concept and had, in fact, been virtually demonstrated in other studies conducted at the Human Factors Laboratory at NAVTRAEQUIPCEN. The concept explored involved the allocation of the function to a "Real-Time" and "Off-Line" structure, with two modes in "Real-Time." The trial allocation was as follows:

"Real-Time" Requirements		"Off-Line" Requirements
Foreground Mode	Background Mode	
Initialize	Brief	Prepare
Train	Debrief	Manage Data
Evaluate		Develop Syllabus
Train IP		
Self/Peer Train		

Although not included, it is clear that the IP training functions not requiring the simulator, such as computer aided training, could be performed in the Background Mode.

The actual software architecture implemented in any given simulator training system must reflect the computing system involved and ideally must exploit the features available. However, it is clear that the state-of-the-art of software design is adequate to support a module concept utilizing remote terminals to support the simultaneous conduct of the tasks as outlined in the above conceptual allocation.

The display and control requirements of the functions were then analyzed to expose design and configuration requirements. The functions were grouped in accordance with the allocation outlined above, which did not constrain the analysis.

The display and control requirements were further structured in terms of the type of information required and the nature of the control functions involved. Display information was subdivided into:

- Alphanumeric
- Graphics
- Hard copy

The controls were subdivided into:

- Training control
- Simulation control

The categories are not truly discrete but serve to emphasize the primary function involved. Table 1 contains the results. An "x" indicates a clear requirement; a "/" indicates a possible requirement depending on the sophistication of the training system and the weapon system involved.

Although the results are somewhat dependent on the detailed characteristics of the design, three results are of interest and have impact on console design. These are:

(1) There appears to be little if any need for direct control of simulation per se.

(2) Alphanumeric display requirements predominate, although a clear need for graphic displays exists.

TABLE 1. FUNCTION DISPLAY AND CONTROL REQUIREMENTS

	Display				Control	
	AN	G	HC		TC	SC
PREPARE -						
Identify session	x					
Assemble materials	x		x			
Review data	x	/				
Develop training session	x	/	/		x	
BRIEF -						
Brief student	x	x			x	
Brief crew			/			
INITIALIZE -						
Configure simulator			x		x	/
Initialize simulator	x	x			x	x
Establish readiness	x					/
TRAIN -						
Control simulator	x				x	/
Monitor performance	x	x			x	
Instruct	x					
Evaluate	x	x			x	
DEBRIEF -						
Debrief student	x	x	/		x	
Debrief crew	/		/			
DATA -						
Student data	x	/	/		x	
Simulator data	x		x		x	
Training data	x		x		x	
SYLLABUS DEVELOPMENT	x	x	/		x	
IP TRAINING -						
Simulator OPS	x	x			x	
Simulator training	x	x			x	/
Syllabus development	x	x	x		x	
Student training	x	x			x	/
SELF/PEER	x	x			x	/

Key:
AN - Alphanumeric
G - Graphics
HC - Hard copy
TC - Training control
SC - Simulation control
x - Requirement
/ - Possible requirement

(3) A minimal requirement for hard copy exists.

The next step taken was to combine display requirements in terms of subject matter and function. Again, the results are somewhat arbitrary but at least serve to identify a feasible set of displays. The trial set developed was such that no detailed design was intended, although where multiple pages are addressed it was clear that this would be required. The displays which were structured include:

(1) Schedule display - a single page display listing:

- Date
- Student
- Instructor
- Syllabus hop
- Simulator scheduled
- Remote console scheduled
- SO(s)
- Equipment status as of (date/time)

(2) Syllabus display - a multi-page display listing:

Page 1 - Hop summary

- Summary of training objectives by priority

- Summary of performance requirements
- List of prerequisites
- List of demonstrations available

Page 2 - Hop events

- Hop events in sequence
- Adaptive logic branches and criteria

Page 3 - Scenario (TACTICAL phase only)

- Mission scenario
- IP/SO activities required
- Scripts

Page 4 - Hop conditions

- Initial conditions
- Pre-planned resets and criteria

(3) Student data display - a multi-page (as required) display listing:

Page 1 - Student history

- Student name, rank, age, Social Security number

- Input source
- Flight experience (hours, hours in types, etc.)
- Syllabus events completed
- Date last flight and last simulator hop

Page 2 - Student performance history

- Syllabus hops and results

Page 3 - IP evaluation data "slate"

(4) Briefing display - a multi-page display (alphanumeric and graphic) for briefing the student, including:

- Summary of scheduled hop
- Objectives and performance requirements
- Flight plan data as applicable
- Communications procedures
- Emergency procedures

(5) Training system status - a status board display showing conditions of all training system components, i.e., motion, visual, computers, etc.

(6) Systems status - a combined alphanumeric and graphic multi-page display showing weapon and flight systems

status, including configuration. Manual or override of system status is available through display mode.

(7) Performance data - a combined alphanumeric and graphics display showing student performance and trends. Relationship to criteria is included.

(8) Situation data - a combined alphanumeric and graphic display of mission area in plane view with "zoom" capability

(9) Tactical data - a combined alphanumeric and graphic display showing tactical situation and permitting control or manipulation of tactical elements, including ground targets, air targets, emitters, etc. (Note - only required for weapons training)

(10) Flight data - a combined alphanumeric and graphics display with zoom capability which displays flight data available in the cockpit

A "relative time line"-based function flow of the major training function was next conducted. Figure 2 shows the Preparation Function Flow with display requirements indicated. The flow separates functions at the simulator console and at the remote console. The dotted line shows current simulator status input by the SO.

Figure 3 shows the Brief and Initialize Function Flow. The dotted lines are used to indicate the physical movement from the remote console to the simulator console and to the cockpit by the IP and the student respectively.

Figure 4 shows the Train Function Flow and Figure 5

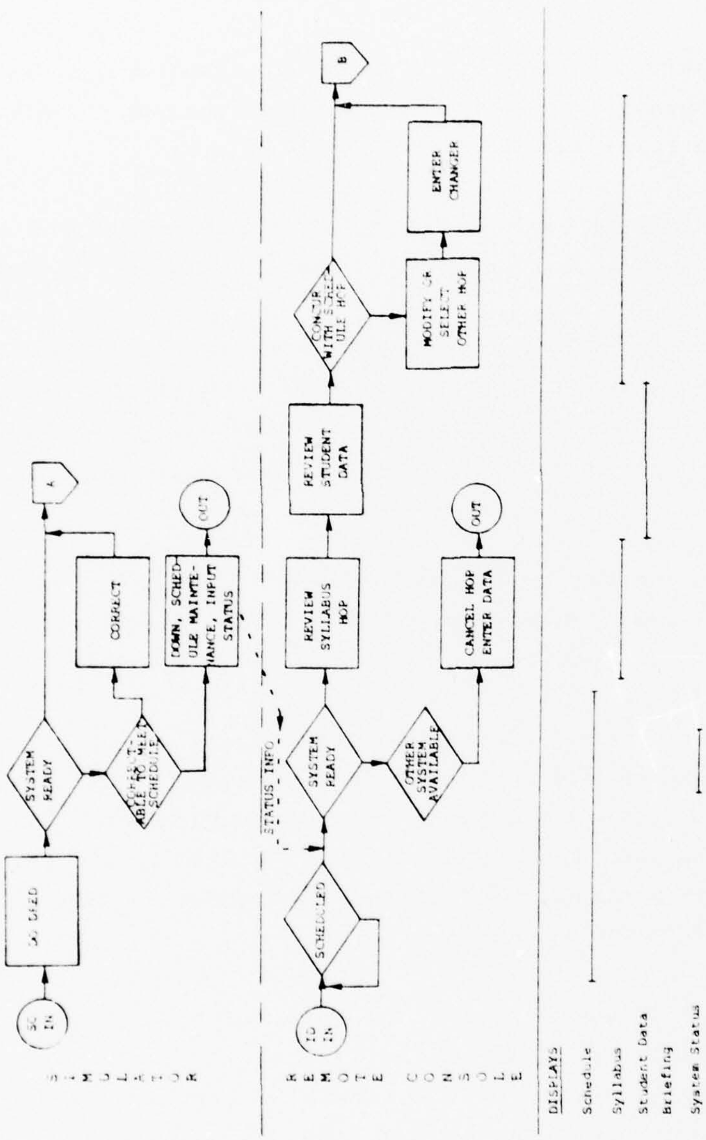


Figure 2. Preparation Function Flow

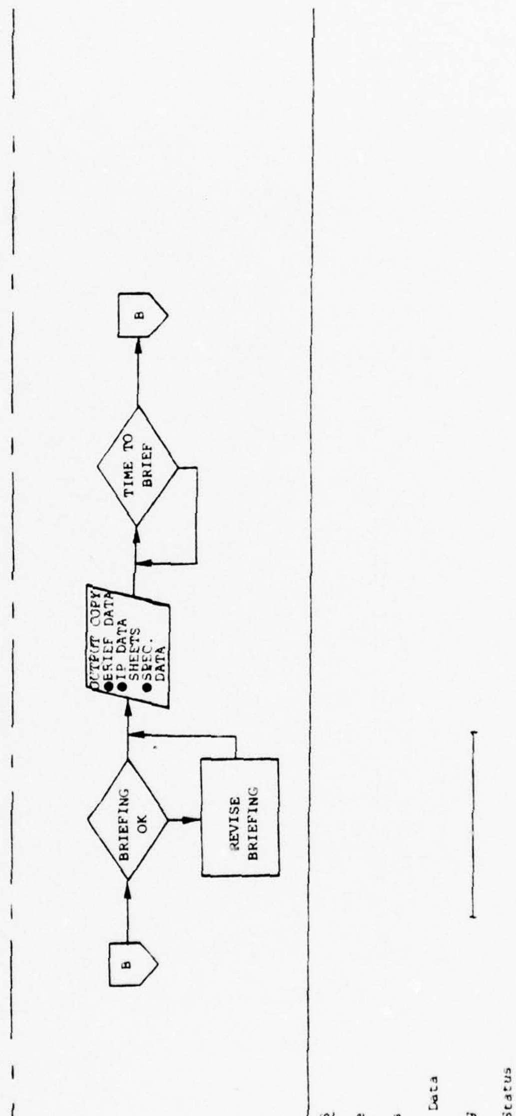


Figure 2. Preparation Function Flow (continued)

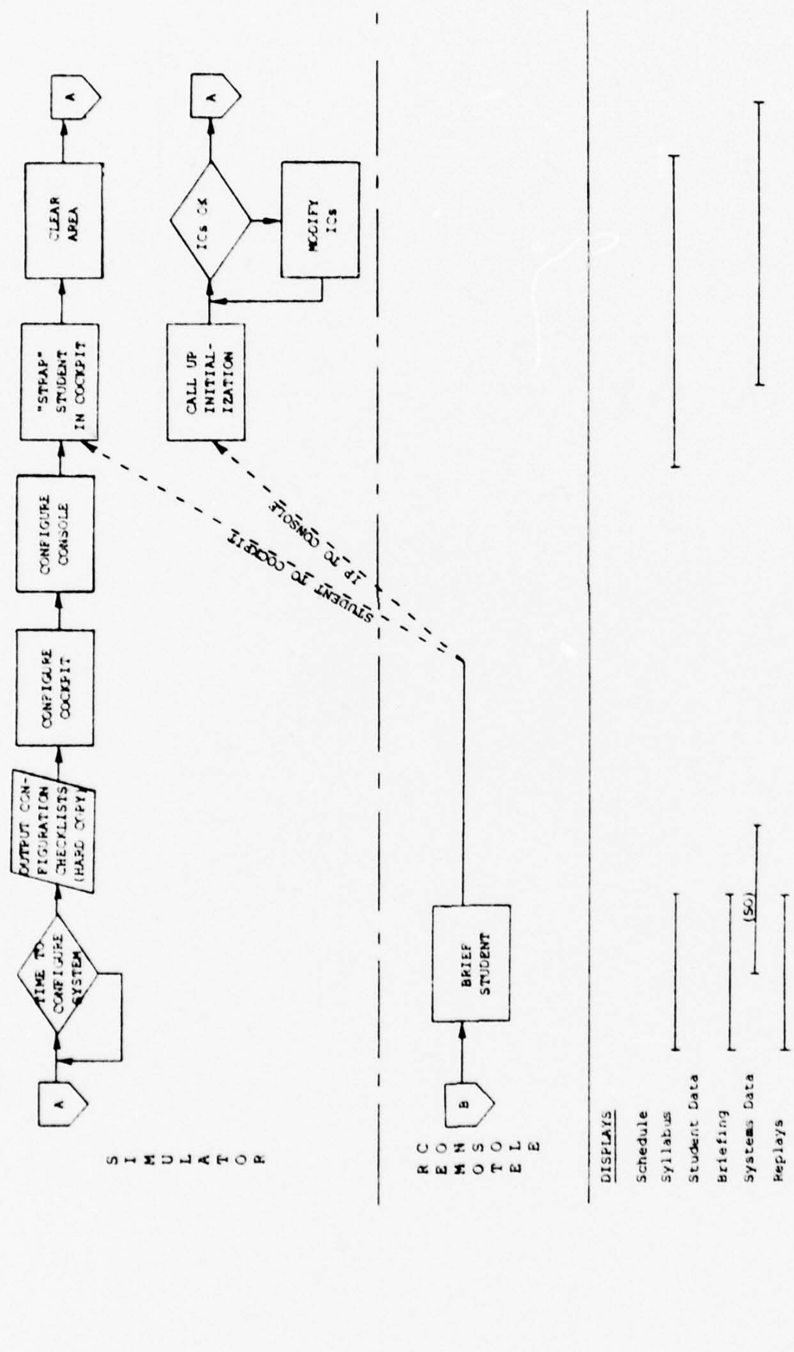


Figure 3. Brief and Initialize Function Flow

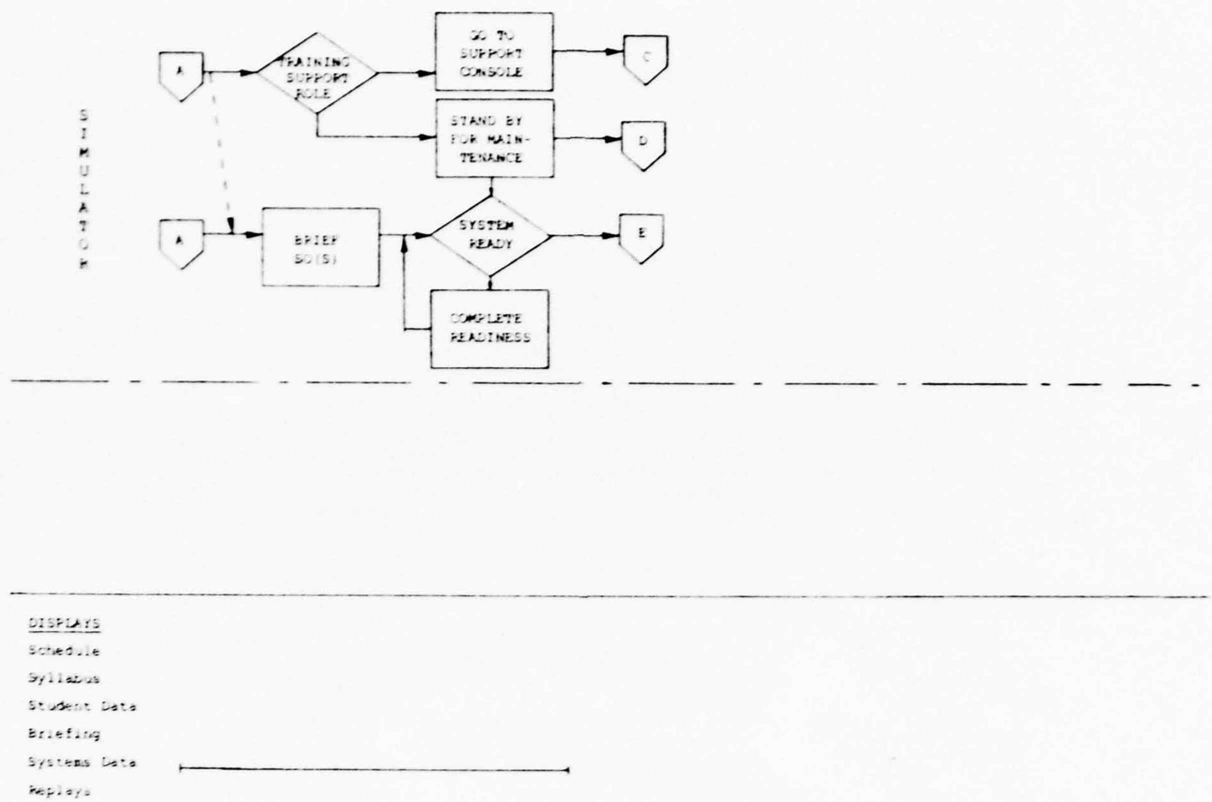


Figure 3. Brief and Initialize Function Flow (continued)

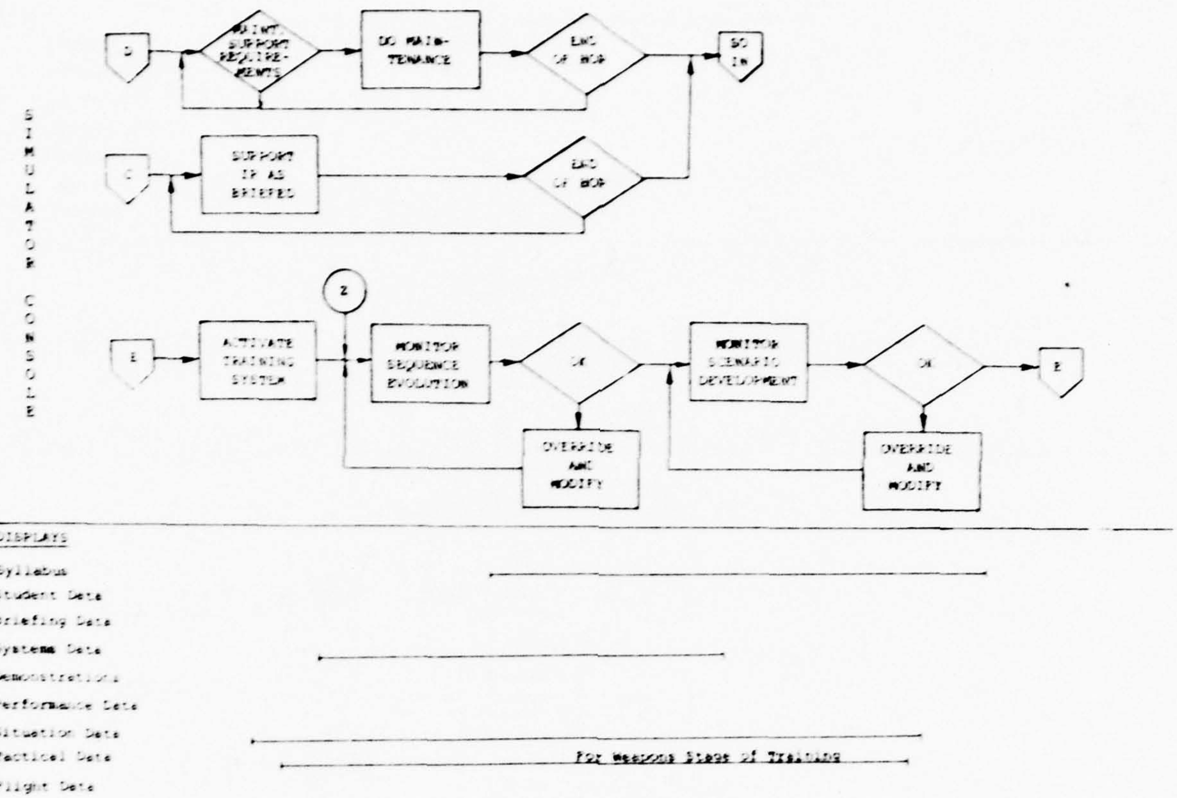


Figure 4. Train Function Flow

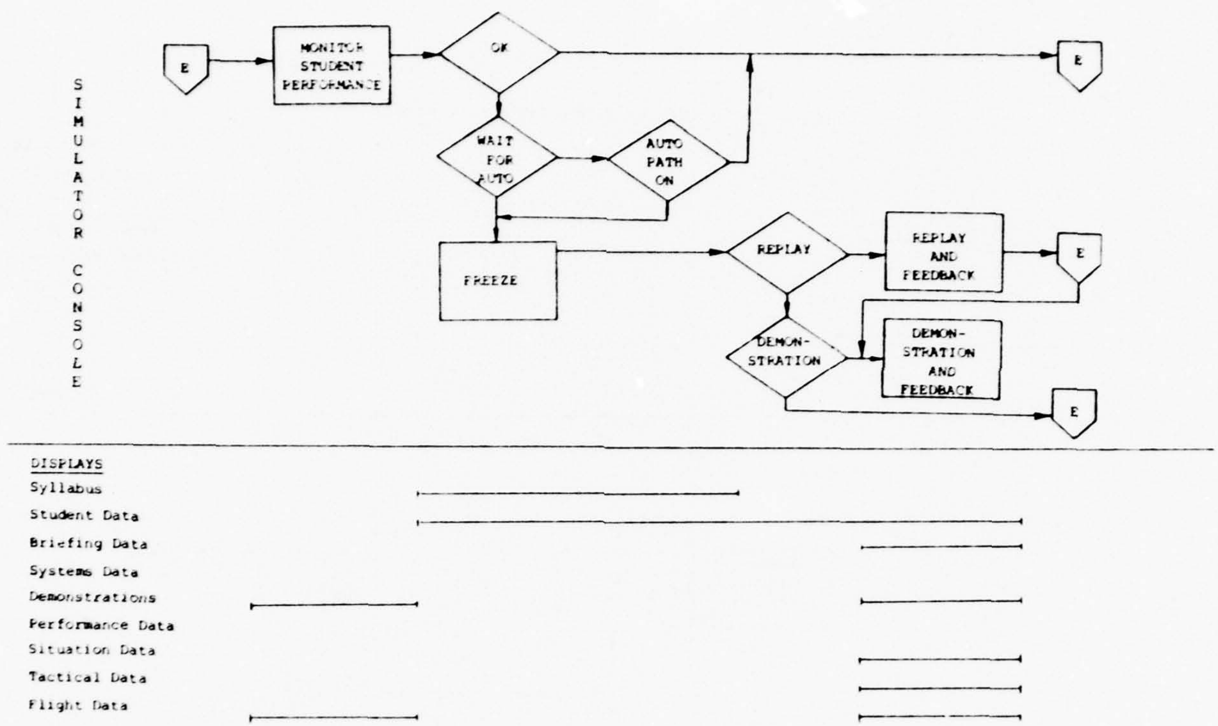


Figure 4. Train Function Flow (continued)

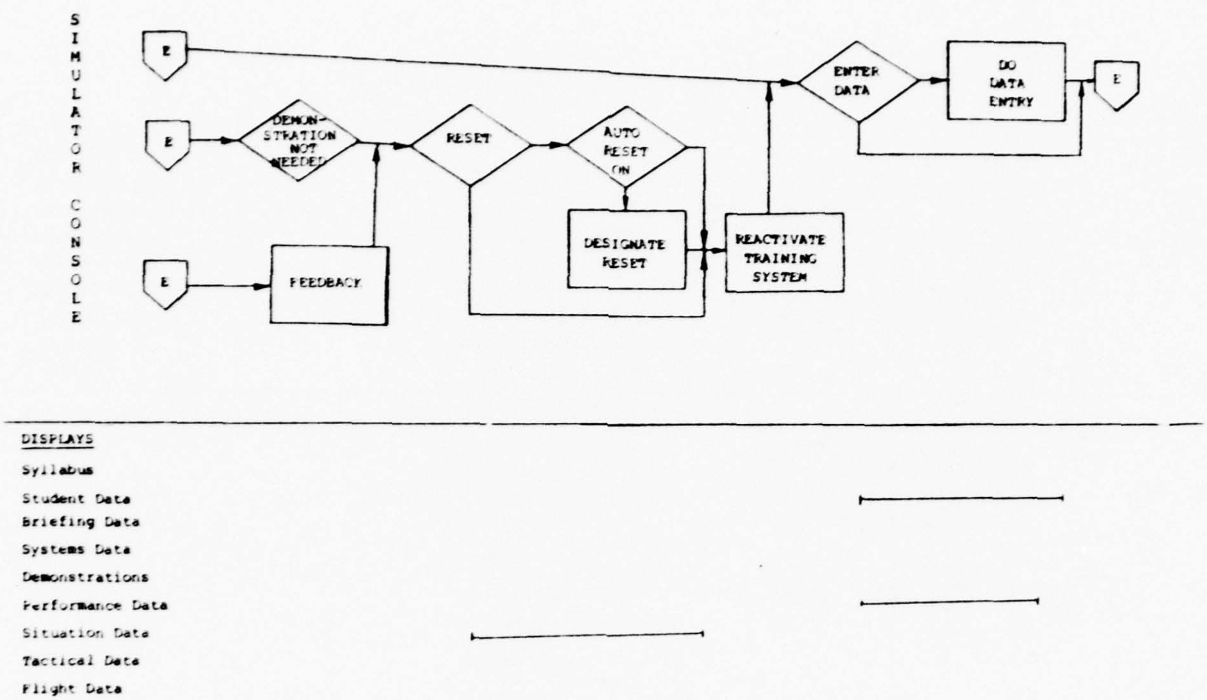


Figure 4. Train Function Flow (continued)

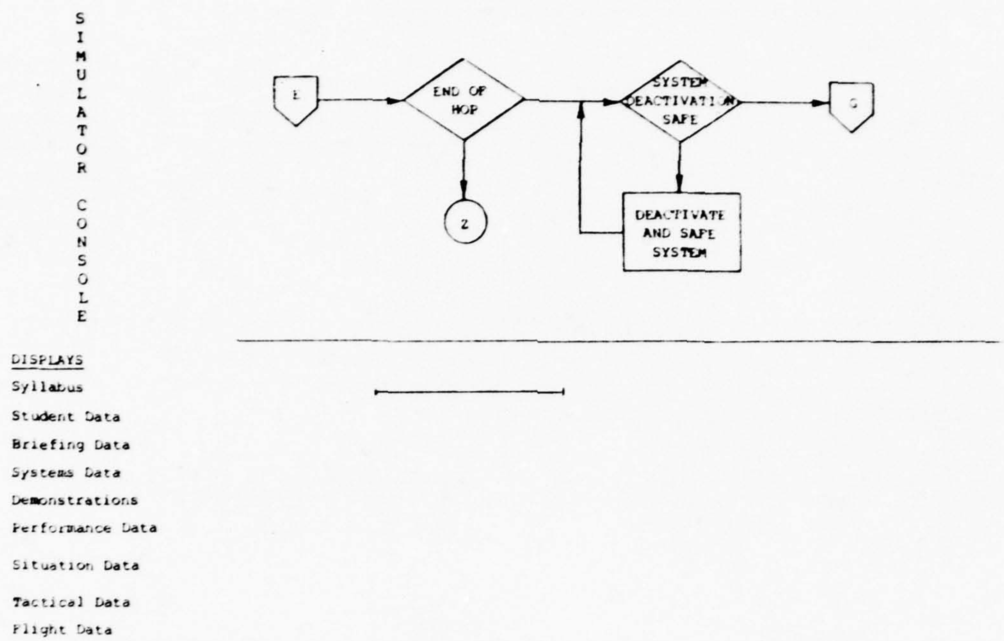


Figure 4. Train Function Flow (continued)

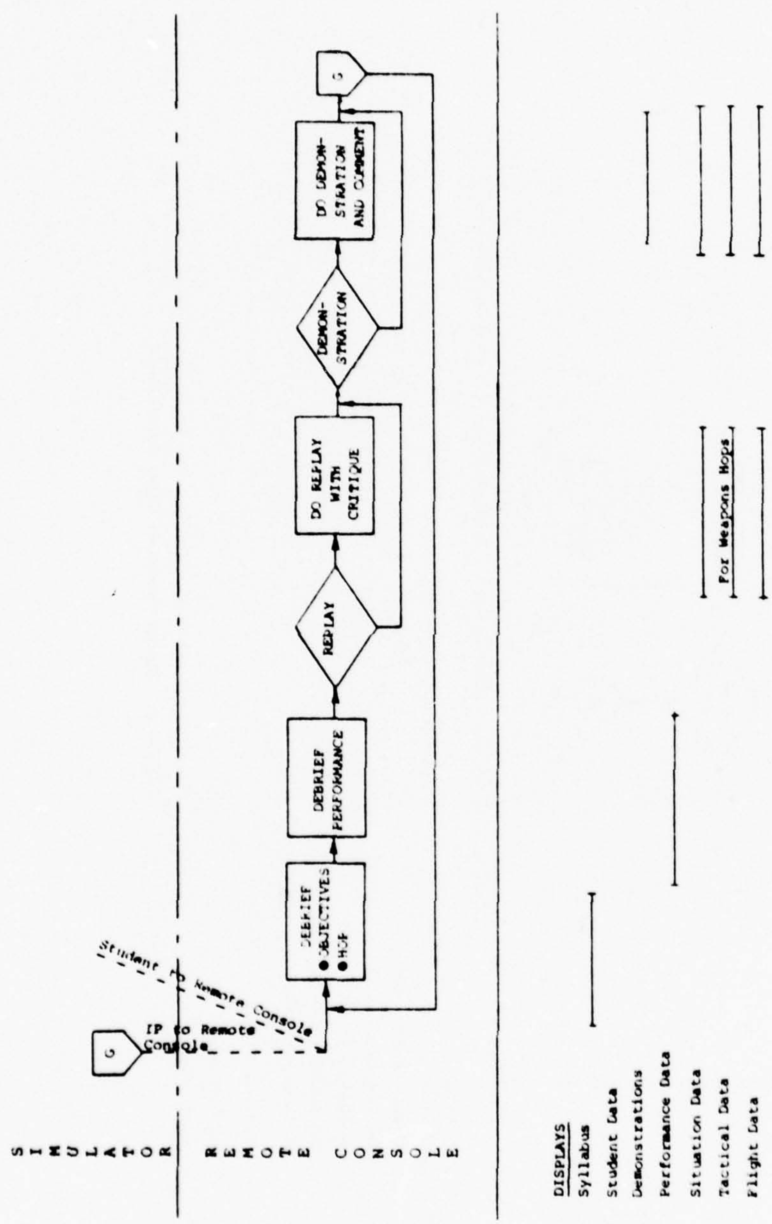


Figure 5. Debrief and Data Management Function Flow

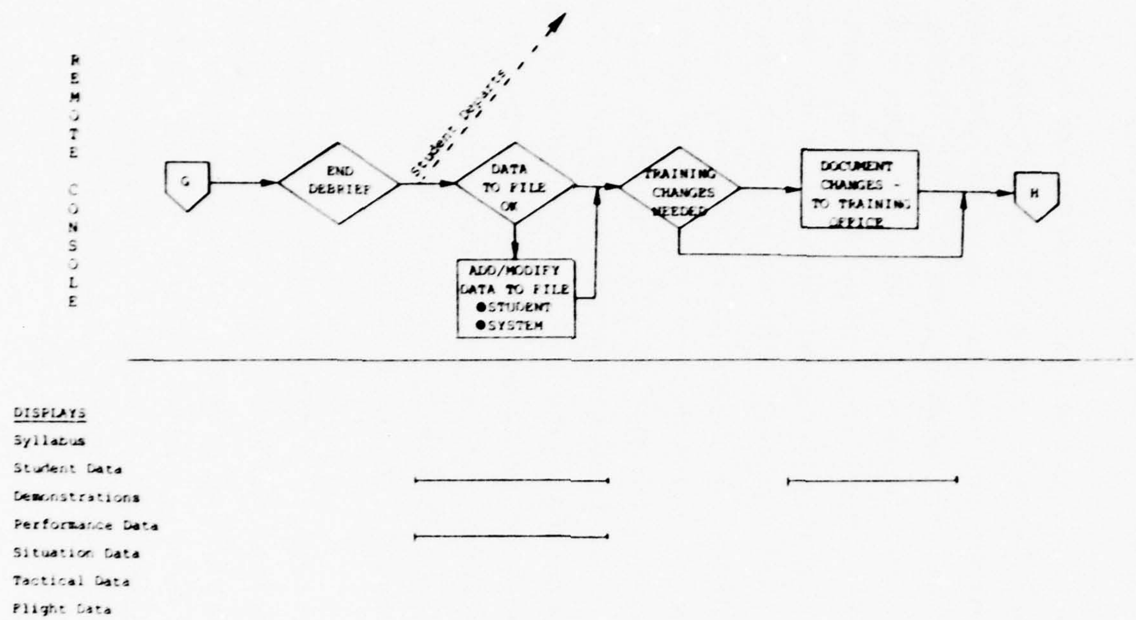


Figure 5. Debrief and Data Management Function Flow (continued)

shows the function flow for the Debrief and Data Management Function Flow. Again, the dashed line shows the physical movement of both the IP and the student to the remote console.

The display utilization which is reflected in Figures 2, 3, 4 and 5 was re-analyzed in terms of content since it appeared that a minimum of technical data was required. The analysis proved relatively meaningless in the absence of a specific weapon system. However, it did not appear that any required data for training purposes had been omitted. This does not imply that additional data would not be requested by the IP, rather that the need did not appear given adequate training system design. In fact, it proved easy to postulate data or displays which would degrade the system significantly. For example, a detailed readout of all simulator parameters before initiating would probably generate control requirements for modification purposes. The end results would either have no effect or degrade the training, given that the syllabus was rationally designed. It has long been recognized that irrelevant information typically leads to equivalent irrelevant manipulation and control to the detriment of required functions.

In short, the display console which falls out of the time line flow involves multiple but dedicated displays as opposed to the all-purpose display concept of modern simulators reported in the Phase II report. Figure 6 is a configuration of simulator console displays based on the analysis. It incorporates the following displays, each dedicated to that function unless otherwise specified.

(1) Flight Display - a content replication of the cockpit displays for attitude, altitude, heading, speed, acceleration, vertical rates, angle of attack, basic power

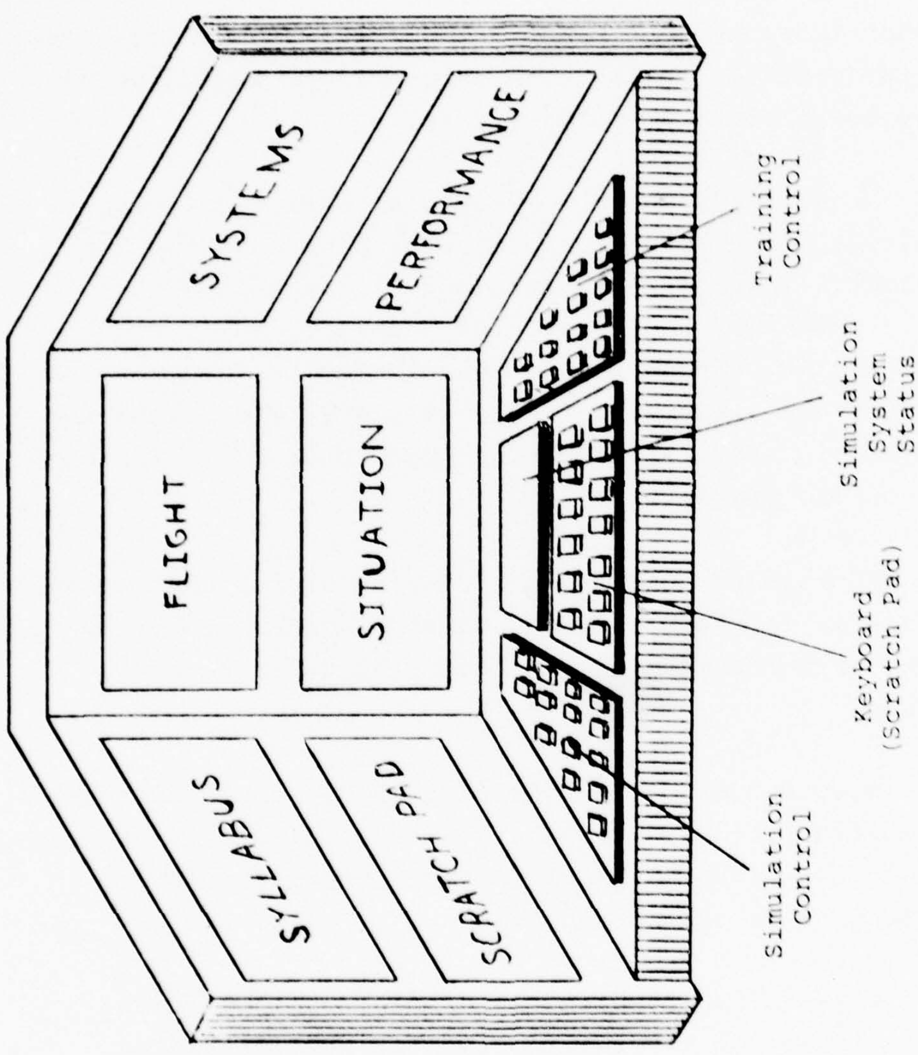


Figure 6. Conceptual IP Generic Console

indicators for the system, configuration, and special flight systems (e.g., wing program). The display provides the IP with the basic information the student should be processing.

(2) Syllabus Display - an alphanumeric display dedicated to syllabus information, including an event status indicator. The display provides the IP with information, including on-going and near future syllabus events.

(3) Situation Display - a navigation/tactical display which maintains the view of the mission plan and progress. In the Familiarization and Instrument Flight stage, the display is primarily radio nav aids and is field/carrier-oriented; in the weapons stage, the display is target-oriented, i.e., ground and airborne targets, emitters, etc. Thus the same display is used for situation data regardless of the flight training stage.

(4) Performance Display - a display of relevant performance measures for each training mission and segment. An IP "slate" or performance measure display quadrant should be provided.

(5) Weapon System Data - a display of weapon system status, configuration, and operation. The display is required for systems in which the pilot operates the weapon system and the content is system-specific.

(6) Scratch Pad Display - a display/control which allows the IP to modify, record, recall, etc., training function data. Since the other displays are dedicated, a planning/preparation/preview type of display is essential for the IP.

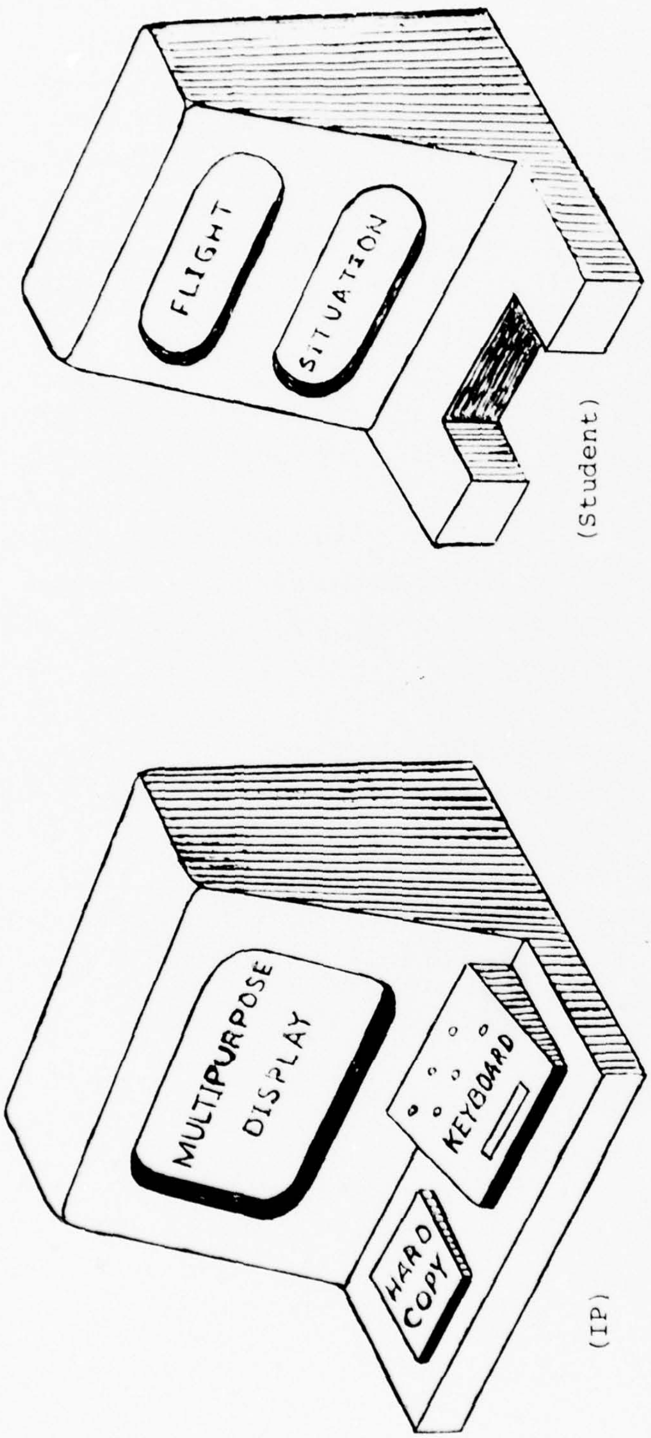
A conceptual remote console to support the Brief/Debrief Syllabus Development Functions is depicted in Figure 7. A system block diagram of the conceptual system is shown in Figure 8. Simulator and training subsystems are shown separately, not only to emphasize the basic difference between the two functions, but also to suggest the possibility of structural separation of the subsystems. Such a differentiation has several attractive features both from design and from maintenance viewpoints.

(1) Simulation and training software are inherently different, e.g., numbers crunching vs. logic operations.

(2) Configuration control responsibility is separated, e.g., simulation software is engineering/weapon system-controlled and training software should be training department-controlled.

(3) Training software is relatively system-independent and thus potentially a standard Navy-provided item; simulation software is system-specific.

(4) Standardization of student data format can permit data to be passed from training unit to unit as well as to a training/personnel center.



(IP) (Student)

Figure 7. Remote Console

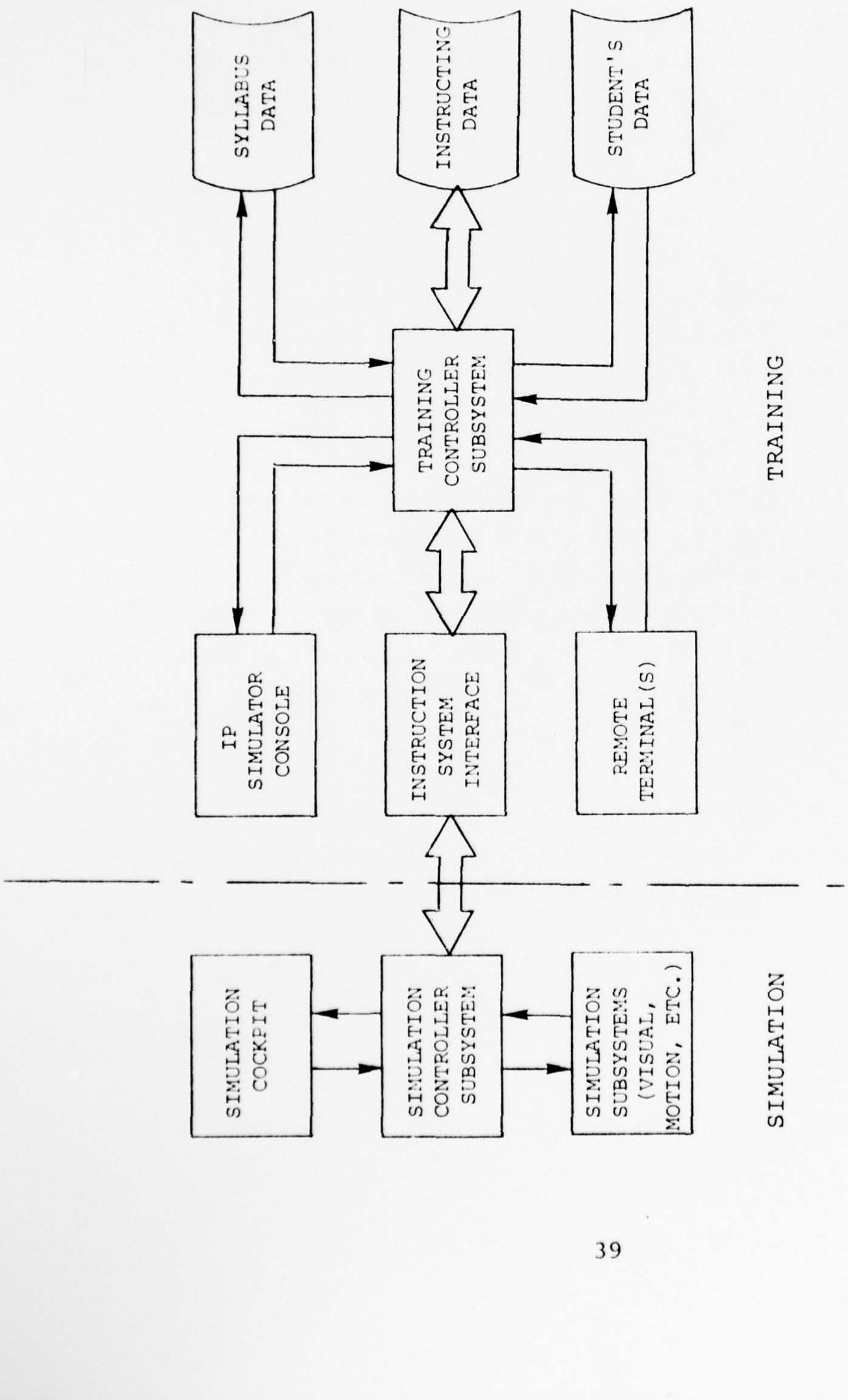


Figure 8. Conceptual System

SECTION V
DISCUSSION

The three phases of the study of the Instructor Pilot's Role in Simulation Training have led to a conceptual system which optimizes the utilization of the IP in the simulation training program. The role of the IP upon which this concept was developed reflects the operational IP as described in the Phase I report, i.e., the IP is both a flight and a simulator instructor. Thus the conceptual system attempts to both exploit the skills developed for flight training as well as prevent any negative transfer between the two instructor situations. Therefore the basic displays used by the instructor in flight are retained in the simulator, i.e., the flight and situation displays.

The synthetic situation, by being a simulation, requires the specification of a host of parameters provided "a priori" in flight (e.g., winds, air temperature, and geographic position). A well-developed syllabus which is easily stored in a modern computer system can, in a similar a priori sense, provide these for the IP. This not only unburdens the IP but promotes standardization of training.

Finally, the simulator can obviously permit hazardous events, even crashes, as training exercises. It can reset, replay, etc., and concentrate training on the student's problems, an approach difficult to accomplish in flight. Again, the implementation of these features is easily mechanized to aid the IP in a procedure which is foreign to flight training.

As yet, performance measurement is largely subjective in flight although instrumented ranges are beginning to provide documentary if not processed performance data. A simulation training system can sample and process pilot, vehicle and system data to at least provide objective-quantitative summaries of events and actions for the IP. The conceptual console developed in Section IV is an approach which reflects these considerations. As such, it should be explored and evaluated.

One result that is of particular interest is that while displays and controls in simulators are typically highly sensitive to weapon system characteristics and configurations, it appears that the conceptual system is not. The functions defined appear to be relatively "universal." If such proves true, the objective of standardized modules appears feasible.

In a similar manner, the functions required for IP training are not dissimilar to those required for student pilot training. Thus the training function implementation should be capable of supporting IP training and standardization checks as well.

As pointed out in the results section, the primary requirement for the system is a detailed development and documentation of the training syllabus. The Phase I report pointed out the general lack of such data in typical training operations. It is clear that the conceptual system cannot be implemented unless appropriate syllabi are developed.

One of the potentially most significant features of the conceptual system is the remote console. The Phase I report pointed out the basic lack of adequate briefing and debriefing functions. What was performed tended to delay or "tie up" the simulator. The analyses clearly show the feasibility of effectively utilizing remote consoles for supporting the briefing/debriefing functions, again given adequate preparation and demonstration. Neither the implementation nor the training preparation and documentation are beyond the state-of-the-art.

Finally, the conceptual system requires multiple displays. The Phase I and Phase II studies were critical of the trend toward CRT displays. However, the problems outlined were related to the literally hundreds of pages of texts and graphics available to the IP. Most were IP option-selected and related to simulation control or system technical data, while few were instruction-oriented. The conceptual display subsystems are the opposite; system displays are dedicated and capitalize on IP skills and experience, i.e., flight, situation, and tactics. Being dedicated, they do not place a burden on the IP, nor can he "degrade" the information content by paging or "dialing up" alternatives. The conceptual system is "by exception" or "override" and training function-oriented, not simulator parameter control-oriented.

SECTION VI
CONCLUSIONS

The following conclusions are based on the analyses conducted. Demonstration, verification and evaluation remain to be accomplished.

(1) A console capitalizing on flight IP skills and capabilities is feasible.

(2) Simulation software and training software should be separated in terms of configuration control and management. Detailed unique programs are required for the conceptual training system.

(3) A multiple set of dedicated displays appears to be attractive for IP use.

(4) Extensive syllabus development efforts are required to implement the conceptual system.

(5) Modular console design is feasible both in terms of hardware and software.

(6) Remote consoles can support training functions and should result in a significant increase in simulator utilization and effectiveness.

SECTION VII
RECOMMENDATIONS

Although the conceptual training system is clearly well within the state-of-the-art, demonstrations of the system should be accomplished before full operational use is attempted. That is not to say that specific system features cannot be applied directly. For example:

(1) Detailed and explicit syllabus development is clearly a requirement regardless of the system employed and should be undertaken.

(2) IP training in simulator operation and training methods as stressed in the Phase I report can and should be undertaken regardless of the type of consoles developed.

(3) Automation of routine functions should be implemented to unburden the IP. While the trend is in this direction, the emphasis should be shifted to training, not simulation control.

The basic objectives of the study, however, were directed toward more efficiently integrating the IP into the simulator training system. The study has clearly shown the conceptual and technical feasibility of accomplishing this. In addition, providing IP training can readily be incorporated. Therefore, the following recommendations are made:

- Demonstrate the remote console concept for briefing and debriefing. User acceptance should be a major test point.

- Demonstrate that the detailed syllabus required can be developed, programmed and accepted.

- Demonstrate that the module concept can be implemented. Conceptually and technically, the approach is feasible. Operational and IP acceptance, however, poses a risk.

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APPENDIX A

IP FUNCTION BREAKDOWN

1 PREPARE FUNCTION

1.1 Identify Session

- Student
- Time
- Simulator
- Syllabus hop
- Simulator status

1.2 Assemble Materials

- Student file
- Syllabus hop description
- Scripts
- Scenarios
- Checklists/Guides
- Initialization data
- Data recording sheets
- Grade sheets
- Simulator utilization sheets
- Flight plans, etc.

1.3 Review Data

- Student history
  - performance problems/weaknesses
  - missing training elements
- Syllabus hop
  - objectives
  - performance criteria
  - priorities
  - implementation procedures

- Simulator status

1.4 Develop Training Session

- Individualize syllabus to students' needs
- Modify initial conditions as required
- Schedule and program malfunctions/emergencies
- Structure controller functions
- Develop tactical scenarios
- Format demonstrations
- Structure performance measurement
- Structure display and control
- Contingency plans
  - performance failures
    - crash
    - missed procedures
    - unacceptable accuracy/quality
  - simulator reset strategy
  - simulator emergency
    - fire
    - hydraulic malfunctions
    - loss of communications
    - area safety
- Outline briefing sessions
  - student(s)
    - objectives
    - criteria
    - procedures/approach
    - simulator problems
  - simulator staff
    - responsibilities
    - evolution strategy

2 BRIEF FUNCTION

2.1 Brief Student(s)

- Planned evolution
- Learning objectives
- Performance criteria
- Simulator emergency procedures
- Simulator discrepancies and characteristics
- Planned use of training controls - freeze, reset, replay, demonstration, etc.
- Communication procedures
- Flight plan data

2.2 Brief Simulator Crew

- Planned evolution
- Support responsibilities
- Emergency procedures

3 INITIALIZE FUNCTION

3.1 Configure Simulator

- Configure simulation system
- Configure crew station
- Configure IP console

3.2 Initialize Simulator

- Enter or verify initial conditions
  - airfield and runway locations, altitudes, and arrangement

- carrier types, positions, speeds, headings, sea state
- radio/navigation aids, locations and characteristics
- target locations, characteristics, and behavior
- environment (ceilings, visibilities, temperatures, winds, magnetic variation)
- aircraft configuration
- aircraft position and heading (if airborne, altitude, heading, speed, attitude and power)
- malfunctions/failures
- preprogrammed malfunctions/emergencies
- data monitor/record settings

● Enter preprogrammed data
● Initialize crew station

3.3 Establish Readiness

● Student(s) strapped in cockpit
● Area secure and safe
● Scripts, scenarios, data sheets, etc., available
● Make communications check with student and crew

4 TRAIN FUNCTION

4.1 Control Simulator

● Activate simulation
● Provide interacting man-system simulations per scripts/guides/scenarios
  - controller functions
  - ground crew functions
  - other aircrew functions
  - other vehicles and targets, air, ground, sea,

submarine, missiles
- radar and early warning system

- Activate/Deactivate emergencies/malfunctions
- Select and activate demonstrations
- Set and select replay
- Freeze
- Initialize and reset
- Monitor safety of operations
- Deactivate trainer at end of session

4.2 Monitor Performance

- Procedures
- Technique
- Skill level
- Simulator performance

4.3 Instruct

- Provide feedback
- Critique
- Correct procedures
- Provide technique advice

4.4 Record

- Data for feedback
- Data for simulator control, i.e., reset, replay
- Data for debrief
- Data for records

5 EVALUATE FUNCTION

5.1 Monitor Relevant Parameter for Segment/Phase/Task

5.2 Establish if Performance within Training Performance Envelope

5.3 If Performance Beyond Envelope, Diagnose Problem

5.4 Select Instruction Technique to Train

5.5 Develop Plan and Data to Implement Technique

5.6 Brief Simulator Crew and Student as Required

6 DEBRIEF FUNCTION

6.1 Debrief Student

- Organize data collected
- Assemble debriefing materials
- Review performance problems (replay if available)
- Review correct procedures, etc. (demonstration if available)
- Review file data
- Outline corrective actions to take

6.2 Debrief Simulator Crew

- Review problems
- Review overall performance
- Discuss simulator discrepancies

7 MANAGE DATA FUNCTION

7.1 Student Data

- Student grade sheets, training sheets

- Simulator training data sheets

7.2 Simulation System Data

- Utilization data
- Discrepancy data

7.3 Training Data

- Problems
- Changes tried/proposed
- Instruction techniques

8 DEVELOP SYLLABUS FUNCTION

8.1 Identify Changes
8.2 Format Changes
8.3 Implement Changes
8.4 Validate Changes

9 TRAIN IP FUNCTION

9.1 Simulator Operation

- Console familiarization
- Console operation
- Operating procedures
- Syllabus implementation

9.2 Simulator Training

- Training functions
- Training techniques

- Evaluation
- Simulator instructing

9.3 Simulator Syllabus Development

9.4 Standardization Training

10 SELF/PEER TRAIN FUNCTION

10.1 Basic Simulator IP Function

10.2 Syllabus Lockouts

- Preclude "getting ahead of instructor"
- Preclude student data file access or change

10.3 Performance Lockouts

- Stop training if performance bad or not improving
- Stop training if skill overlearned

GLOSSARY

AN	Alphanumeric
ASW	Anti-submarine Warfare
G	Graphics
HC	Hard Copy
IC	Instructor Console
IP	Instructor Pilot
NFO	Naval Flight Officer
OPS	Operations
SC	Simulation Control
SO	Simulator Operator
TC	Training Control

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